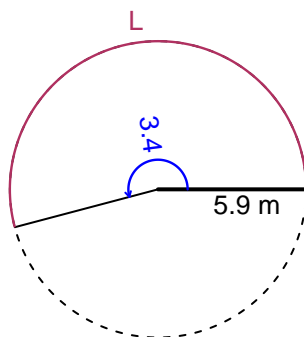# Trig Final (SLTN v689)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.4 radians. The radius is 5.9 meters. How long is the arc in meters?
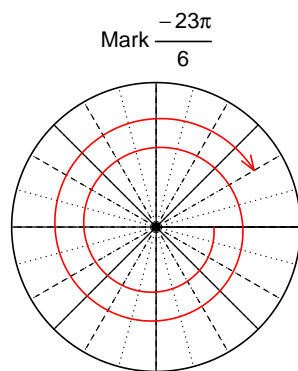

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
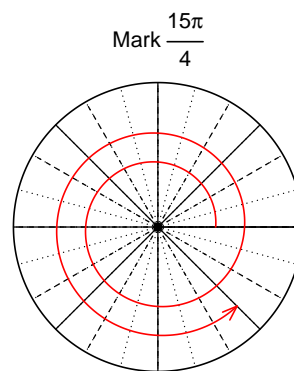
$L = 20.06$ meters.

Question 2

Consider angles $\frac{-23\pi}{6}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-23\pi}{6}\right)$ and $\cos\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-23\pi}{6}$

Find $\sin(-23\pi/6)$

Mark $\dfrac{15\pi}{4}$
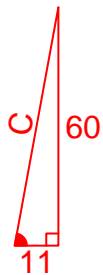
Find $\cos(15\pi/4)$

$\sin(-23\pi/6) = \frac{1}{2}$

$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$

1

Question 3

If $\tan(\theta) = \frac{60}{11}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.
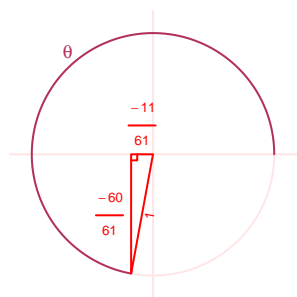
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\sin(\theta) = \frac{-60}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 5.23$ meters, an amplitude of 3.42 meters, and a frequency of 6.72 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 3.42\cos(2\pi 6.72t) + 5.23$$

or

$$y = 3.42\cos(13.44\pi t) + 5.23$$

or

$$y = 3.42\cos(42.22t) + 5.23$$